

## SECTION 16460

### TRANSFORMERS (LOW VOLTAGE)

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Extent of transformer work is indicated by drawings and schedules.
- B. Types of transformers specified in this section include the following:
  - 1. Dry-type transformers.
- C. Electrical wiring connections for transformers are specified in applicable Division 16 Sections.

#### PART 2 - PRODUCTS

##### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one (1) of the following:
  - 1. General Electric Company.
  - 2. Hevi-Duty Electric Div.
  - 3. Square D Co.
  - 4. Cutler-Hammer (Eaton Metal).
- B. The Contractor shall verify that the size of the equipment supplied by the selected manufacturers does not exceed the available mounting space.

##### 2.2 DRY-TYPE TRANSFORMERS

- A. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer and as required for complete installation.
- B. Dry type transformers shall be NEMA AA air cooled, two (2) winding type (fan cooling is not acceptable). KVA ratings and voltages shall be as indicated on the electrical plans or schedule.
- C. Single-phase transformers through 15 KVA and 3-phase transformers 6 KVA through 15 KVA shall have two (2) 5% full capacity taps below normal rated primary voltage, all transformers 25 KVA through 300 KVA shall have two (2) 2-1/2% full capacity taps above normal & four (4) 2-1/2% full capacity taps below normal rated primary voltage. Transformers rated 500 KVA shall have two (2) 2-1/2% full capacity taps above normal and two (2) 2-1/2% full capacity taps below normal rated primary voltage.
- D. Transformers shall be designed so that under full load the average conductor temperature does not exceed 115°C rise.
- E. All insulating materials shall be in accordance with NEMA ST20 Standards for a 220°C UL component recognized insulation system.

- F. Transformer coils must be vacuum impregnated with non-hygroscopic thermosetting varnish.
- G. The core and coil shall be completely isolated from the enclosure by means of vibration absorbing mounts. There shall be no metal to metal contact between core and coil and the enclosure. On units 500 KVA and smaller, the vibration isolating system shall be so designed as to provide for continual securement of the core and coil unit to the enclosure. Sound isolating systems requiring the removal of all tie down facilities will not be acceptable. Sound levels shall not exceed the following values: 15 to 50 KVA, 45 decibels - 51 KVA through 150 KVA, 50 decibels - 151 KVA to 300 KVA, 55 decibels - 301 - 500 KVA, 60 decibels. Certified test data on individual units shall be submitted at the request of the Engineer without charge.
- H. All ventilating openings shall be of the louvered type, expanded metal covering will not be accepted. The base of the transformer shall be constructed of 12-gauge steel minimum with stamped openings for ventilation.
- I. Lifting eyes or provisions should be provided on all transformer enclosures, holes in the enclosure requiring the use of spreader bars will not be acceptable. The transformer enclosure shall be degreased, cleaned, and phosphatized with one (1) coat of zinc chromate primer and one (1) coat of baked enamel.
- J. The core and coils shall be visibly grounded in the frame of the transformer cubicle by means of a flexible grounding strap of adequate size. A maximum case temperature shall not exceed 35°C rise above a 40°C ambient at its warmest point.
- K. Transformers used outdoors or in high moisture areas shall be suitable for such locations.
- L. Equipment/System Identification: Provide equipment/system identification nameplates complying with Division 16 Basic Materials and Methods Section Electrical Identification.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Installer must examine areas and conditions under which power/distribution transformers and ancillary equipment are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- C. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- D. Verify that ground connections are in place and requirements in Division 16 Section "Grounding and Bonding" have been met. Maximum ground resistance shall be 5 ohms at location transformer.

#### 3.2 INSTALLATION OF TRANSFORMERS

- A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, ANSI and IEEE Standards and in accordance with recognized industry practices to ensure that products fulfill requirements.

- B. Coordinate transformer installation work with electrical raceway and wire/cable work, as necessary for proper interface.
- C. Transformers shall be mounted on pad-type vibration isolation pads similar to Aeroflex EZ cut pads.
- D. Connect transformer units to electrical wiring system; comply with requirements of other Division 16 Sections.
- E. All external wiring connections to units shall be made with liquid-tight flexible metal conduit.
- F. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A and B.
- G. Transformers shall be floor mounted where possible unless otherwise indicated.
- H. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.
  - 1. Brace wall-mounting transformers as specified in Division 16 Section "Electrical Support and Seismic Restraints."

### 3.3 GROUNDING

- A. Provide equipment grounding connections for power/distribution transformers in accordance with the NEC and as indicated on the drawings. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

### 3.4 TESTING

- A. Prior to energization of transformers, check all accessible connections for compliance with manufacturer's torque tightening specifications.
- B. Prior to energization, check circuitry for electrical continuity and for short-circuits.
- C. Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION